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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CROW, ROBERT THOMAS	
ART UNIT	**PAPER NUMBER**
1634	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/756,767	KYO ET AL.	
	Examiner	Art Unit	
	Robert T. Crow	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17,20-27,29-31 and 33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17,20-27,29-31 and 33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8 February 2007 has been entered.

Status of the Claims

2. This action is in response to papers filed 8 February 2007 in which claims 17 and 21 were amended, claims 18 and 32 were canceled, and no new claims were added. All of the amendments have been thoroughly reviewed and entered.

The objections to the specification listed in the previous Office Action dated 25 September 2006 are withdrawn in view of the amendments.

The previous rejections under 35 U.S.C. 112, second paragraph, are withdrawn in view of the amendments.

The previous rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) not reiterated below are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed and are addressed following the new rejections necessitated by the amendments.

Applicant states on page 12 of the Remarks filed 8 February 2007 that claims 1-18, 20-27, and 29-42 are pending. However, as noted above, Applicant has cancelled claims 18 and 32. Therefore, claims 17, 20-27, 29-31, and 33 are under prosecution.

Claim Objections

3. Claim 17 is objected to because of the following informalities: claim 17 recites the limitation "bonded to said substrate of a cross-linking agent" in lines 15-16 of the claim. This appears to be a typographical error. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 20 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 20 and 33 are each indefinite in the recitation "an array which includes a marker indicative of a spot" at the end of each of claims 20 and 33. It is unclear if "an array which includes a marker indicative of a spot" is the double stranded oligonucleotide array of independent claims 17 and 21.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. The rejections presented below are new rejections necessitated by the amendments.

8. Claims 17, 21-27, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corn et al (U.S. Patent No. 6,127,129, issued 3 October 2000) in view of Fodor et al (U.S. Patent No. 5,424,186, issued 13 June 1995).

Regarding claim 17, Corn et al teach a biomolecule interaction measuring method. In a single exemplary embodiment, Corn et al teach providing a double-stranded oligonucleotide array comprising a background region on which a hydrophilic polymer molecule is immobilized and a region on which a plurality of double-stranded oligonucleotides are immobilized on a metal substrate; namely, Figure 1, wherein PEG is the hydrophilic polymer (column 10, lines 27-28) on the background region, the substrate is gold, and the attached DNA is double stranded (column 12, Example 1). Corn et al further teach measuring the interaction between said double-stranded oligonucleotides and a biomolecule or aggregate thereof; namely, SPR (i.e., surface plasmon resonance) imaging measurements are taken of the binding of single-stranded DNA binding protein to an array of double-stranded DNA sequences (figure 5 and Example 1). Corn et al further teach each of said double-stranded oligonucleotide include a first single-stranded oligonucleotide and a second single-stranded oligonucleotide, said first and second single-stranded oligonucleotides being entirely or partially bonded together in a complementary manner to form said double-stranded oligonucleotide; namely, the array has double stranded DNA sequences (Example 1). Corn et al also teach only said first single-stranded oligonucleotide is bonded to said substrate; namely, Figure 5, wherein the double-stranded DNA is prepared by immobilizing an oligonucleotide (e.g., D2) and hybridizing the complement to the sequence (column 13, lines 7-28).

Corn et al also teach the first single stranded oligonucleotide is bonded to said substrate by use of a heterobifunctional polymer molecule in the form of the hydrophilic polymer MUAM (column 7, lines 53-54), which has a mercapto group covalently bound to a surface of a solid surface (i.e., X; column 3, lines 58-59) and an amino group (i.e., Y) which attaches to the DNA (step 5 of Figure 4). Corn et al do not teach a hydrophilic repeating unit of the polymer.

However, Fodor et al teach an array of oligonucleotides immobilized in an array on a surface of a substrate (Abstract), wherein the oligonucleotide is immobilized using a heterobifunctional linker having a functional group X in the form of an amine and a functional group Y in the form of a carboxyl group which is derived from photocleavage of the molecule NVOC, and a hydrophilic repeating polymer in the form of ethylene glycol oligomers (column 14, lines 28-45 and column 3, line 52-column 4, lines 5). Fodor et al also teach the linker comprising the NVOC group has the added advantage of allowing the use of lithographic techniques for synthesizing the oligonucleotide polymers on relatively small and precisely known locations on the substrate (column 2, lines 60-67).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the method comprising heterobifunctional linkers as taught by Corn et al with the specific heterobifunctional linker of Fodor et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a method having the added advantage of allowing the use of lithographic techniques for synthesizing the first single-stranded oligonucleotide polymers on relatively small and precisely known locations on the substrate as explicitly taught by Fodor et al (column 2, lines 60-67).

Regarding claims 21-27, and 29-30, Corn et al teach a biomolecule interaction measuring method. In a single exemplary embodiment, Corn et al teach measuring the interaction between a first biomolecule and a second biomolecule or an aggregate thereof in the form of taking SPR (i.e., surface plasmon resonance) imaging measurements of the binding of single-stranded DNA binding protein to an array of single-stranded and double-stranded DNA sequences (i.e., claim 27; Figure 5 and Example 1). Corn et al also teach use of a solid substrate with a solid surface comprising a background region on which a hydrophilic polymer molecule is immobilized other than the area; namely, Figure 1, wherein PEG is the hydrophilic polymer (column 10, lines 27-28) on the background region, and the PEG is not on

the other areas of the substrate. The substrate also has a region on which said first biomolecule is immobilized; namely, DNA is immobilized on areas other than those where the PEG is immobilized (Figure 1).

Corn et al also teach the method wherein the solid surface comprises a thin gold layer formed on said surface (column 3, line 53-column 4, line 8). The thin gold layer further comprises two polymeric molecules; namely, step 7 of Figure 2, which shows the gold layer bound to a first polymeric molecule having a thiol bound to the gold (i.e., X'), followed by the organic group (CH2)11 (i.e., R') and the amino group (i.e., Y'). The amino group is then bound to a heterobifunctional hydrophilic polymer molecule; namely, PEG-NHS, wherein the NHS end is the first functional group, PEG is the hydrophilic polymer portion of the molecule, and the other end of the PEG does not have an NHS functional group, which makes the hydrophilic polymer heterobifunctional because one end is NHS and the other end is different (i.e., claim 25; Figure 2).

Corn et al further teach the method wherein said substrate includes plural kinds of first biomolecules arranged thereon in an array arrangement; namely, Figure 1 and Example 1, wherein Example 1 has two different DNA sequences immobilized on a checkerboard surface (i.e., claim 26; column 12, lines 45-55).

Corn et al also teach the method wherein the interaction between said first biomolecule and said second biomolecule or aggregate thereof is measured through surface plasmon resonance imaging (i.e., claim 29; Figure 6; column 5, lines 40-50), and wherein said second biomolecule is a protein; namely, single-stranded DNA binding protein (i.e., claim 30; Example 1).

Corn et al also teach the first single stranded oligonucleotide is bonded to said substrate by use of a heterobifunctional polymer molecule in the form of the hydrophilic polymer MUAM (column 7, lines 53-54), which has a mercapto group covalently bound to a surface of a solid surface (i.e., X; column 3, lines 58-59) and an amino group (i.e., Y) which attaches to the DNA (step 5 of Figure 4). Corn et al do not teach a hydrophilic repeating unit of the polymer.

However, Fodor et al teach an array of oligonucleotides immobilized in an array on a surface of a substrate (Abstract), wherein the oligonucleotide is immobilized using a heterobifunctional linker having a functional group X in the form of an amine and a functional group Y in the form of a carboxyl group which is derived from photocleavage of the molecule NVOC (i.e., claim 24), and a hydrophilic repeating polymer in the form of ethylene glycol oligomers made up of 2-10 monomers (i.e., claim 23; column 14, lines 28-45 and column 3, line 52-column 4, lines 5). The heterobifunctional polymer has a molecular weight of 200 to 2000 (i.e., claim 22). Fodor et al also teach the linker comprising the NVOC group has the added advantage of allowing the use of lithographic techniques for synthesizing the oligonucleotide polymers on relatively small and precisely known locations on the substrate (column 2, lines 60-67).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the method comprising heterobifunctional linkers as taught by Corn et al with the specific heterobifunctional linker of Fodor et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a method having the added advantage of allowing the use of lithographic techniques for synthesizing the first single-stranded oligonucleotide polymers on relatively small and precisely known locations on the substrate as explicitly taught by Fodor et al (column 2, lines 60-67).

9. Claims 20 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corn et al (U.S. Patent No. 6,127,129, issued 3 October 2000) in view of Fodor et al (U.S. Patent No. 5,424,186, issued 13 June 1995) as applied to claims 17 and 30 above, and further in view of Noblett (U.S. Patent No. 6,362,004 B1, issued 26 March 2002).

Regarding claims 20 and 33, the method of claim 17 and 30 are discussed above on pages 3-5 and 5-7, respectively. Corn et al do not teach markers indicative of spots.

However, Noblett et al teach the use of microarrays comprising immobilized nucleic acids (column 1, lines 20-30) having marks indicative of spots (i.e., fiducials, Abstract) with the added advantage of allowing positioning and alignment of the substrate for spot analysis and comparison procedures (Abstract).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was made to have modified the method as taught by Corn et al in view of with the fiducials as taught by Noblett with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in allowing positioning and alignment of the substrate for spot analysis and comparison procedures as explicitly taught by Noblett (Abstract).

10. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corn et al (U.S. Patent No. 6,127,129, issued 3 October 2000) in view of Fodor et al (U.S. Patent No. 5,424,186, issued 13 June 1995) as applied to claim 30 above, and further in view in view of Wiegel et al (U.S. Patent No. 6,107,034, issued 22 August 2000).

Regarding claim 31, the method of claim 30 is discussed above on pages 5-7. Corn et al do not teach markers indicative of spots. While Corn et al also teach the second biomolecule is a protein in the form of single-stranded DNA binding protein (Example 1), Corn et al do not specifically teach transfer factors.

However, Wiegel teaches the detection of binding of a transfer factor to nucleic acids (e.g., GATA-3 binding to the DNA motif recognized by the protein; column 3, lines 52-63) and the use of nucleic acid arrays (column 6, lines 3-14) with the added benefit that detection of the transfer factor GATA-3 provides a diagnostic test for a hormone responsive tumor (Abstract).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the method comprising detection of protein binding as taught by

Corn et al in view of Fodor et al with the transfer factor protein GATA as taught by Wiegel et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in providing a diagnostic test for a hormone responsive tumor as explicitly taught by Wiegel (Abstract).

Response to Arguments

11. Applicant's arguments with respect to the rejections of the claims presented in the previous Office Action have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendments.

Conclusion

12. No claim is allowed.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert T. Crow whose telephone number is (571) 272-1113. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Robert T. Crow
Examiner
Art Unit 1634

RAM R. SHUKLA, PH.D.
SUPERVISORY PATENT EXAMINER